جامعة سوسة
University of Sousse
1986

FERMAT
Forum for Electromagnetic Research Methods and Application Technologies
Pierre de Fermat
1601-1665

ENISo I o T CHALLENGE
internet of things

Ecole Nationale d'Ingénieurs de Sousse
المدرسة الوطنية للمهندسين بسوسة

ENISo IoT Challenge

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Biography

Taha BEN SALAH has a PhD degree in Telecommunications from ENIT (National School of Engineers of Tunis, Tunisia) in 2010 and an engineering degree in Computer Science from ENSI (National School of Computer Science, Tunisia) in 2000.

He first worked as software engineer and CTO in several IT companies (from 2000 to 2010) before joining National School of Engineers of Sousse (ENISo) as Associate Professor, where he teaches “Simulation and Numerical Modeling” and “Distributed and Parallel Systems”. Since 2015, he holds the position of director of Computing Engineering Department at ENISo.

His main research interests are numerical methods for antenna modeling.

His skill and passion for Libre software led him to publish and still the main developer and maintainer of many open-source software such as : tmwlib/tmwlab (Library and Simulator implementing some numerical methods for microwave and antenna modeling in java and scala), nuts (Network updatable Things service, a package/things manager), VR portal (School Web Education Portal), UPA (Unstructured Persistence API, ORM) , doovos (Distributed object oriented virtual operating system), dbclient (multi-purpose database client), and many other tools..

Abstract

Internet of Things is an ideal topic to vehicle students interest in engineering and its immediate impact on everyday's life. It has the ability to assemble distinct students from distinct engineering fields with very distinct expectations and yet all find room for innovation with successful cooperation. It gathers skills in electronics, mechanics, software, networking, safety, security, communication, energy efficiency, artificial intelligence, machine learning, distributed systems and so many other fields and therefore it stands as the outstanding topic engineering institutions should focus on to motivate students in "Learning by doing" and "Team learning".

That said, ENISo IoT Challenge is a National (Tunisia) Challenge organized by ENISo (National Engineering School of Sousse, Tunisia) held once a year. In this presentation we will discuss motivations, 2017's edition highlights and will conclude with the challenge Theme/Statement as presented to students (translated from French, the official language in Tunisia) at the challenge kick-off. This experience was highly appreciated by both students and industrial partners and hence sharing this experience becomes relevant.

Keywords: Internet of Things, Challenge, Team learning

EIoTC : ENISo IoT Challenge

ENISo IoT Challenge is a challenge organized by ENISo that started in its first edition on April 2016 from 13 to 17. It was, then, the very first challenge on Internet of Things in Tunisia. The first edition was local, only students from ENISo were allowed to participate.

The second Edition, held on Mars 28th to 1st April 2017, was promoted national and was open to all other Tunisian engineering schools.

The event challenges teams from distinct universities to think of, design and elaborate, within 48H in a row, an innovative IoT device and solution to solve a particular problem (detected by the team) in tune with a larger set of problems expressed by the challenge organizers as “Challenge Theme” or “Challenge Statement”.

The teams are evaluated based on a 5mn pitch and the solution prototype in front of a jury of well known figures in the local industry.

EIoTC : Motivations

ENISo is a relatively young (since 2005) public engineering school in Soussa, one of the main cities in Tunisia. It is about 800 students (per year) and 70 permanent teachers. ENISo is organized in three departments, “Computer Engineering”, “Industrial Electronics” and “Advanced Mechanics”.

As many teachers have classes from more than one department we ended up with some facts :

- Students from one department are more likely to show unconcern with disciplines of other departments

- From the other hand, these very students tend to thinks they are sufficiently equipped to tackle multi-disciplinary problems and hence find no need for teaming with other students (student clubs and associations are some how discipline centric)

EIoTC : Motivations

- Albeit students are meeting between each two course sessions (the school is kind of small), synergy between students from different disciplines and thus departments is almost absent

- Students gain motivation in everyday problem solving to the extent that they are within their scientific scope

- Real life problems are far from uni-disciplinary

- Partnership and effective collaborations between industrial institutions and academic institutions are to be valued insistently (which is barely the case in most public education institutions)

- IT based and innovation based entrepreneurship should be engineering school’s spearhead as unemployment is a national concern

EIoTC : ENISo IoT Challenge 2017

That said, ENISo IoT Challenge was proposed to face, in a way, such problems and to help improving students autonomy and skills.

ENISo IoT Challenge 2017 took place at ENISo from March the 28th to April the 1st according to the following schedule :

1. The teams applications (from February 15th to March the 20th and then extended to the 26th): gather student teams (before knowing the statement)
2. The Opening Ceremony (on Tuesday March the 28th): a set of conferences and workshops. Then the theme is revealed
3. The Challenge (Thursday March 29th and Friday 30th) : 48H in a row, each team in a separate room
4. The Closing Ceremony (on Saturday April the 1st) : pitch & demonstration, winners revealed, awards

EIoTC : Application & Team Selection

6 students of three distinct programs from the same institution are required to team up and subscribe as a multi-disciplinary team. This helps a better experience exchange between students of the same school and ends up with a better understanding of the strengths and weaknesses of each member in each discipline.

Each 2 of the team should follow the same program. This should help better fatigue management strategies and removes the risk of loosing some features of the solution due to a member unavailability.

Challenge theme is held secret and teams are applying without knowing of it.

EIoTC : Application & Team Selection

Each team applies for the challenge by submitting a “Team” Curriculum Vitae to the challenge web platform http://eniso-iot-challenge.tn to encourage students to think about the group complementarities and synergy rather than the individualities.

10 teams are selected by a jury of volunteer teachers. At least one team from each distinct engineering school is selected. Diversity and different schools participation is prioritized.

Actually we have planned to make interviews with each team to make a better selection but unfortunately this was a bit cumbersome and difficult to set up this year but we have plans to apply this by next year.

EIoTC : Opening Day

The Opening Day was planned as a set of conferences on Internet of Things on the morning and then a set of Workshops at the afternoon.

The main aim of the Opening Day is to familiarize students with the IoT concepts, glossary and applications.

We were honored with the kind presence of Professor Raj Mittra from PennState University (USA), M. Wassim Galai from Orange Telecoms, a subsidiary of the French Telecom Company and one of the 3 local Telco Operators and many other local companies representatives (ICTOS, ITServ, Harvest Group, …).

They talked about IoT challenges, laws and regulations, networks and technologies, strategic studies and company experiences in the field.

EIoTC : Opening Day

The end of the conferences is characterized by the revealing of the theme of the 2017’s challenge which was “Smart City” (on 2016 it was “Smart Agriculture” by the way) and the revealing of the selected 10 teams (out of 26) to participate to the challenge.

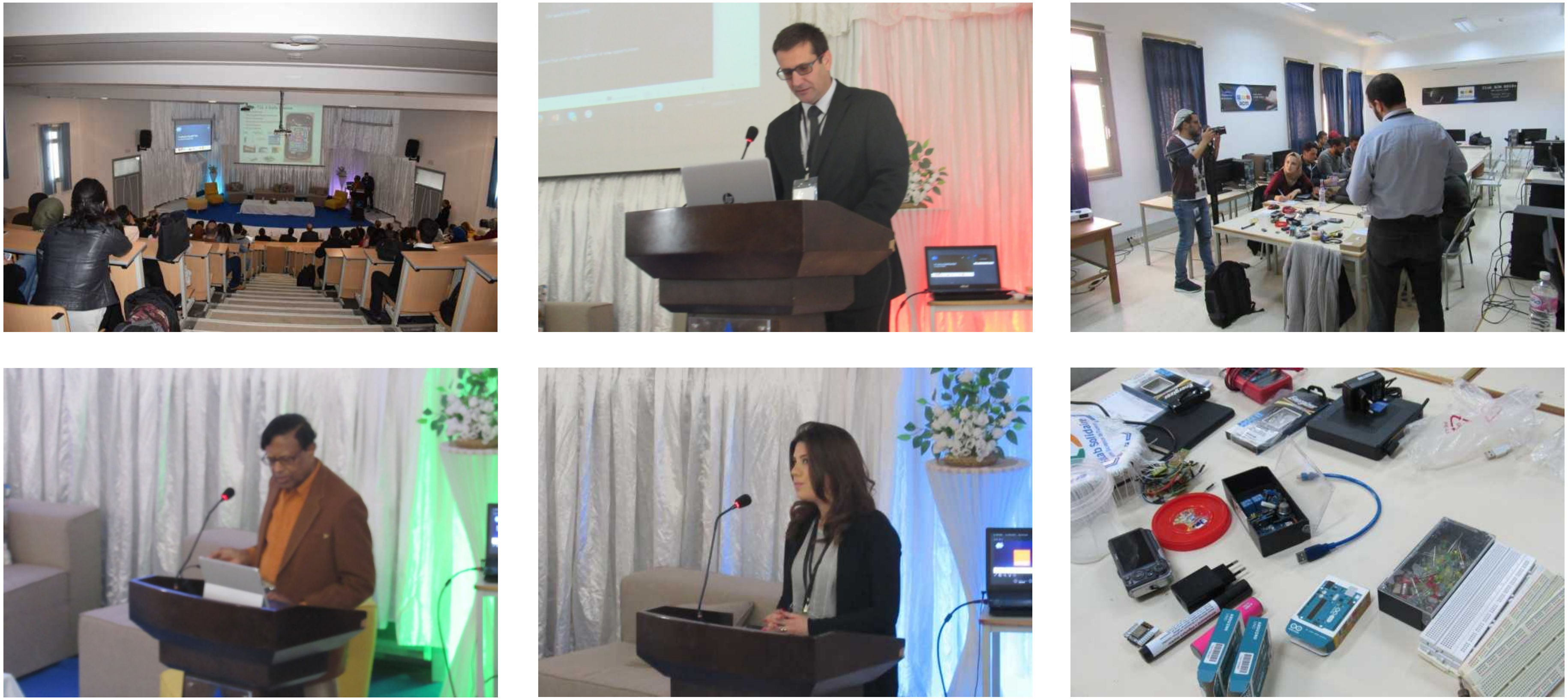
A playful presentation was used to introduce the theme and the teams and explain rapidly the rules the teams should stick to not to be disqualified during the 48H challenge. This presentation is provided in the second part of this document (after being translated from French, the official language in Tunisia).

EIoTC : Opening Day

Workshops (scheduled for the afternoon) were much more technical as they dealt with themes like “IoT Node design”, “Hacking IoT Things”,” Machine Learning & Google Tensor Flow”, “: “Embedded Systems Integration”, and “AI Google API” while being presented by local companies experts (Orange, Waycon, INFOR)

Each workshop was attended by at most 20 persons. They were open to all presents but selected team members where prioritized.

EIoTC : Opening Day



Main Speakers

Workshops

EIoTC : Challenge Days

Challenge started on Tuesday March 28th at 8H30 am and lasted to Saturday 1st April at 8H30. Every team was housed in a separate classroom in the School. The Food was borne by the organizers, and team members were not allowed to quit their rooms for the remaining 48H.

The very same set of devices and tools were also given to each team : open-hardware (Raspberry, Arduino, STM32), sensors (Motion, temperature, humidity, accelerometer, gyro sensors, …) and actuators (stepper motor,…) so that projects are evaluated equally.

The teams have had an extra 36 hours to think about the theme (revealed two days before) but, yet they brain storm for an another 12 hours (almost all of them, we have noticed). Fatigue starts to get noticed by the dawn of the next day as most of the members will do a sleepless night.

EIoTC : Challenge Days

Challenge Days kick off with all of 10 participating teams

Teams working

EIoTC : Challenge Days

Then, stress gained the teams, they started to ask for extra materials (other types of sensors, more wheels, more stepper motors, …), which of course is not allowed, to finally resign by adapting and sticking to the constraints. We find that an excellent exercise. Students get mature rapidly.

Stress also played tricks between teammates and some of them started to get more and more nervous and bicker this and that ; but because if one member quits the room all the team is disqualified, team members cooperated, all of them, to fix the misunderstanding between their teammates.

By the end of the 48 hours, albeit teams were distinctly exhausted, they seemed happy and proud of their projects to be presented in less than an hour.

EIoTC : Closing Day

The closing day was an open ceremony in which each team were asked to pitch for 5 minutes in front a jury of well known figures in the local industry at the amphitheater of the school.

The Jury was composed of CEOs of well known IT and Telecoms local companies (Waycon, ITServ and Sofrecom) as well as the CEO of WikiStartup, a business angel company, the Research and Innovation Lead of Orange Telecom and the University Relations Leader North-West Africa of IBM.

After pitching, the teams were asked to make a demonstration of their prototypes and the jury was moving from one stand to another to evaluate the projects.

The ceremony made also room for the signature of a Partnership between ENISo and Sofrecom before the winners were pronounced and awarded.

EIoTC : Closing Day

Partnership Signature with Sofrecom

Project demonstration

Awarded project

Team Pitch in front of Jury

Project demonstration

Teams & Jurys

EIoTC : Some Videos & Links

https://www.youtube.com/watch?v=2EbuPZqRdp0

https://www.youtube.com/watch?v=TFjMNHrIRYQ (arabic)

https://www.youtube.com/watch?v=qN39993uc1A

http://eniso-iot-challenge.tn

facebook https://www.facebook.com/enisoiotchallenge

http://www.eniso.info

http://www.eniso.rnu.tn

Ecole Nationale d'Ingénieurs de Sousse

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ENISo IoT Challenge 2017
Theme finally unveiled

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2017-04-06

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Toto sounds very bad when he sings…

Toto is an engineer

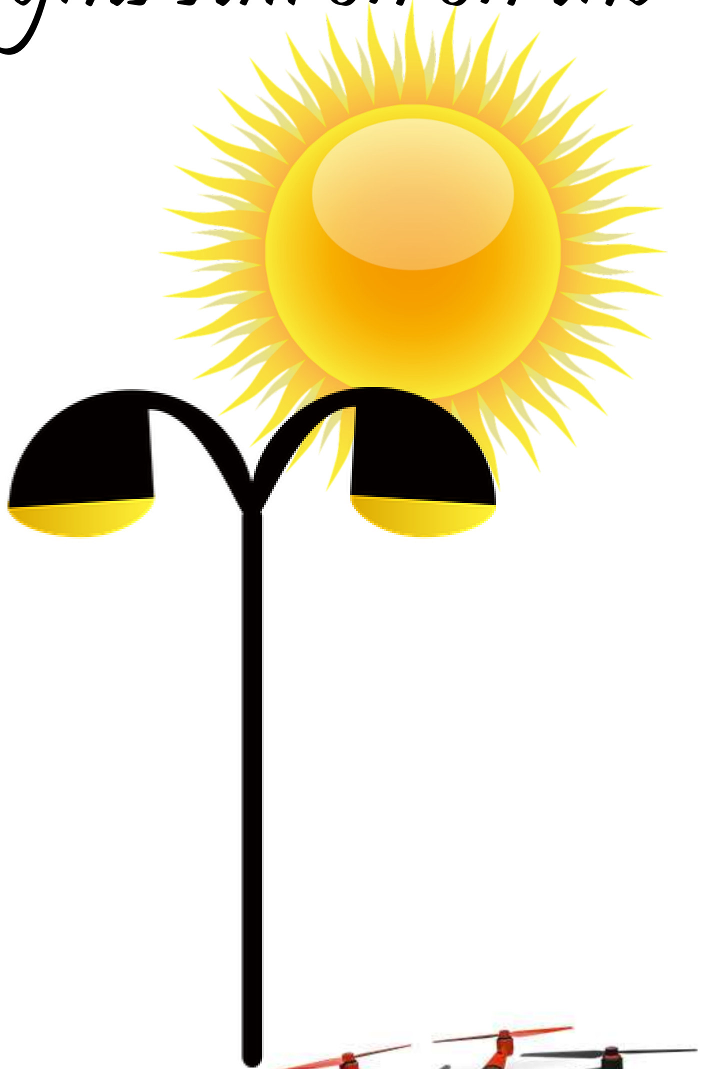
For the past 10 years, Toto has been working in the States with Professor Mittra

He is doing very well, still…
He misses his homeland,
Tunisia.
So he came back for a week
and he saw that…

Grumpy as he is, he finds everything going WRONG…

Even though, nothing has really changed….

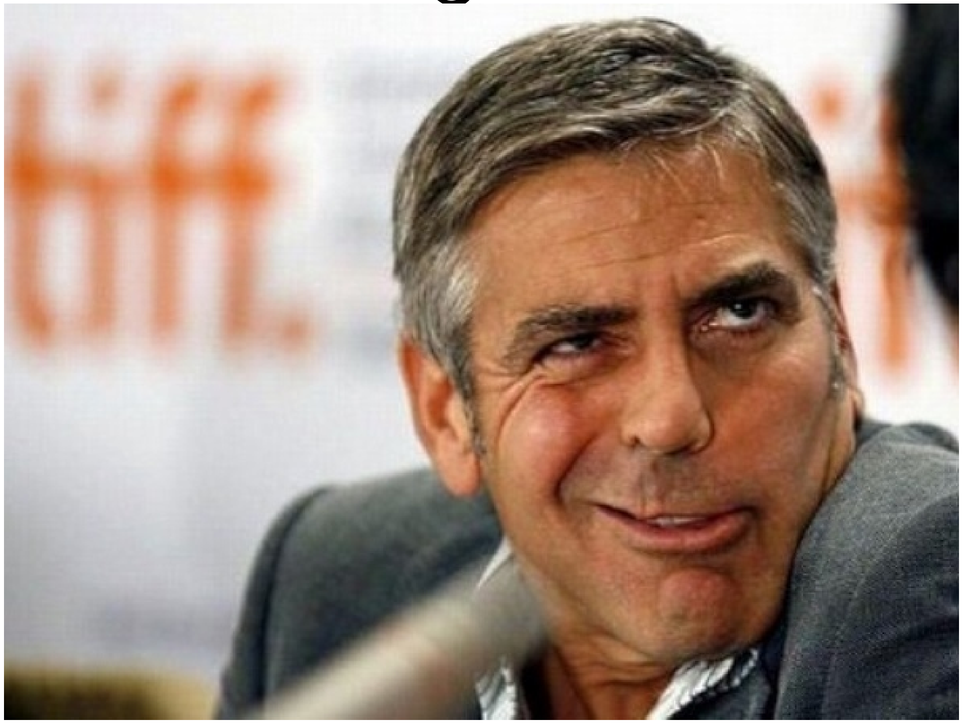
Street Lights still on on the morning



Buses are never on time

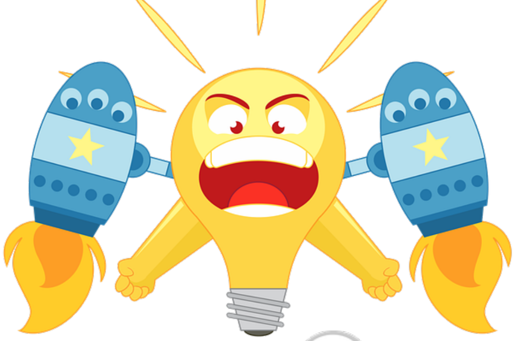
Ecology is a neologism for many people

In short, it's not that smart, his city…

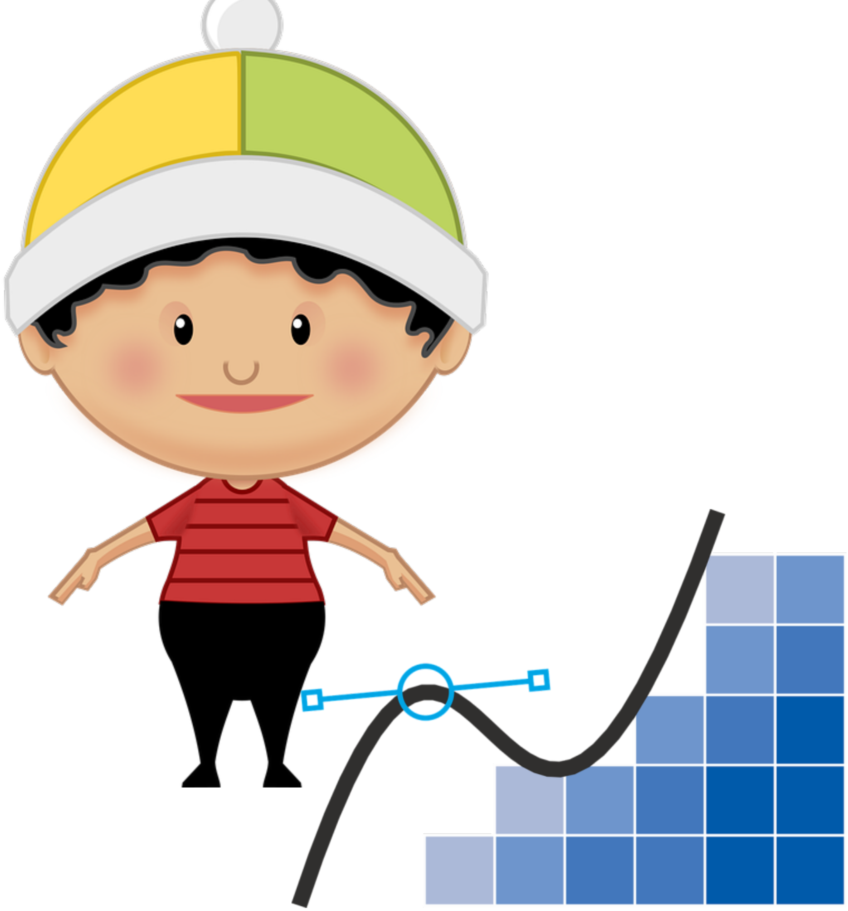


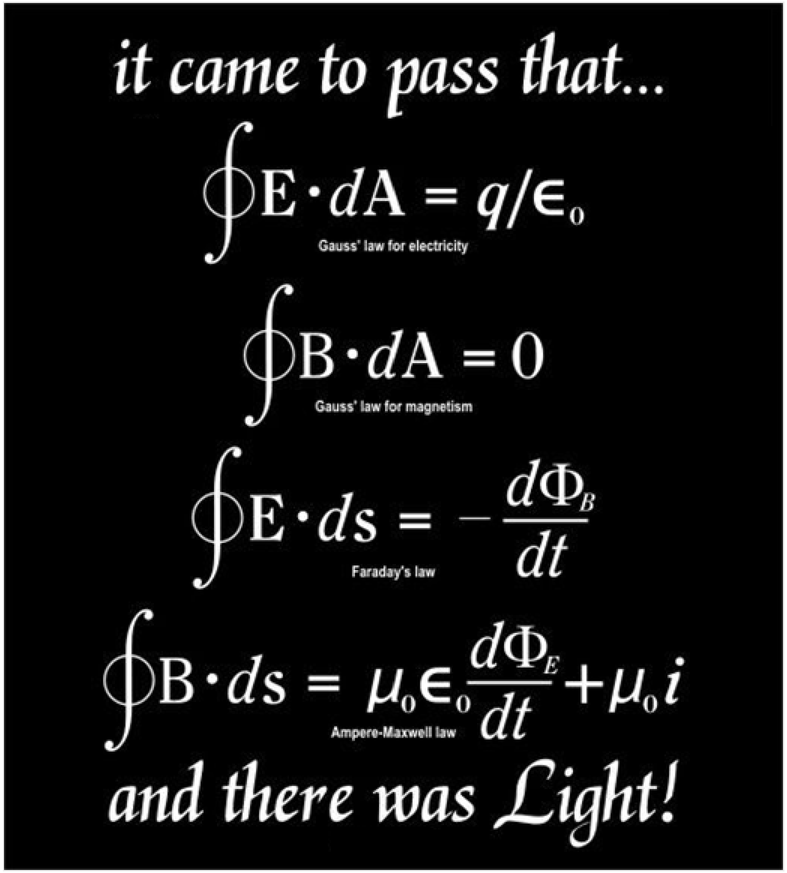
"Et pourtant . . . "

And yet . . .



Hopefully, nothing has changed either… because…





it came to pass that...

$$\oint \mathrm{E}\cdot d\mathrm{A} = q/\epsilon_0$$

Gauss' law for electricity

$$\oint \mathrm{B}\cdot d\mathrm{A} = 0$$

Gauss' law for magnetism

$$\oint \mathrm{E}\cdot ds = -\frac{d\Phi_B}{dt}$$

Faraday's law

$$\oint \mathrm{B}\cdot ds = \mu_0\epsilon_0\frac{d\Phi_E}{dt}+\mu_0 i$$

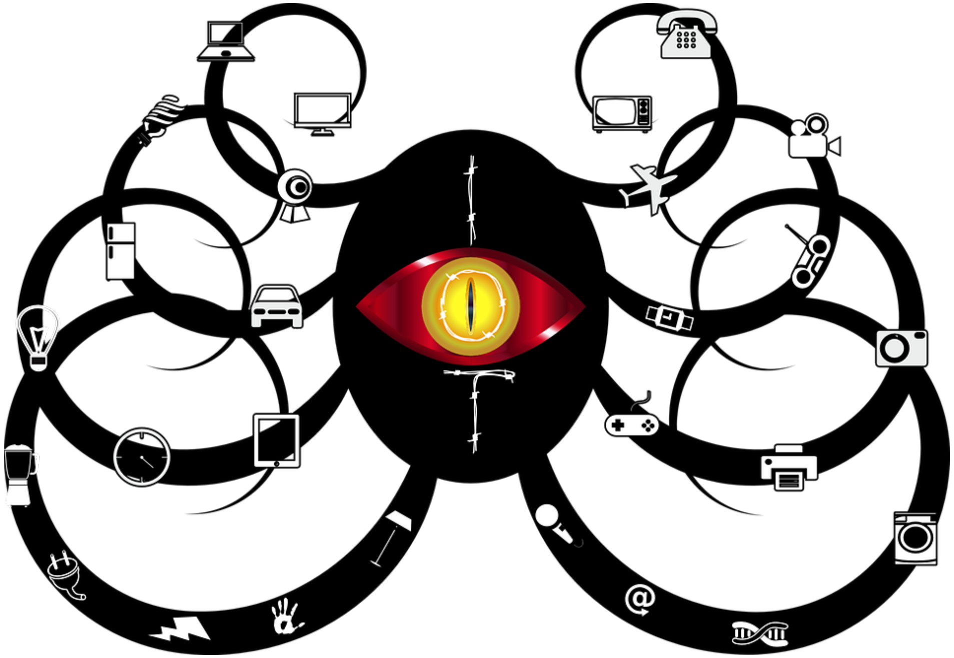
Ampere-Maxwell law

and there was Light!

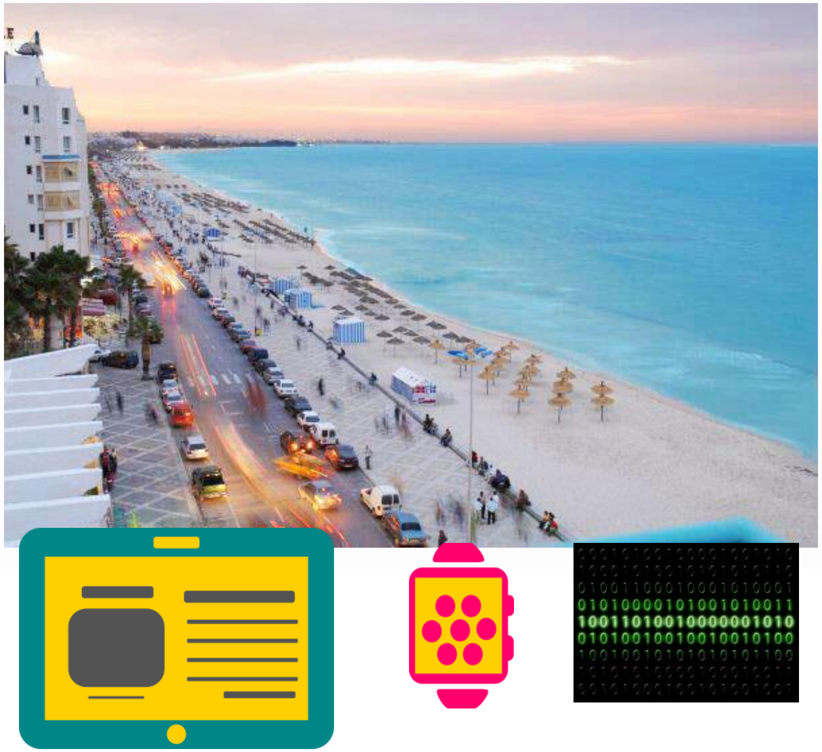
And...

Toto stills sound very bad when he sings…

Toto is an engineer



Toto has heard a lot about Internet of Things

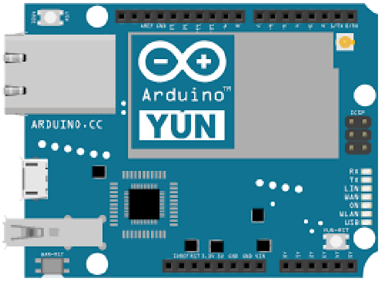


He is convinced he can make it Smart, his beloved city "Soussa"...

And it happens that Toto loves to make bets

Toto makes the bet of making his city a little PARIS

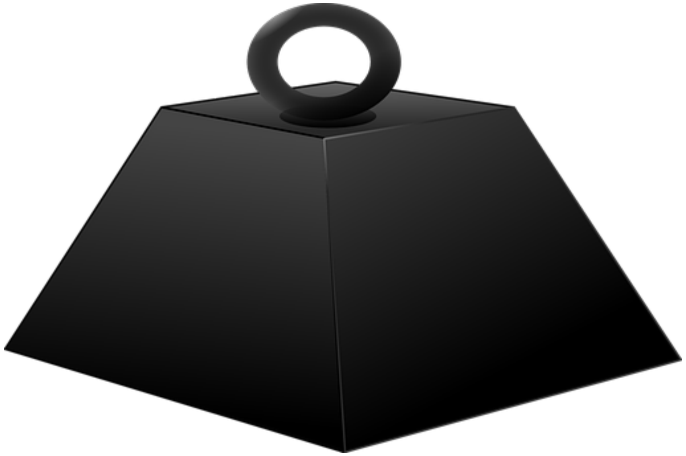
He armed himself with open-hardware :

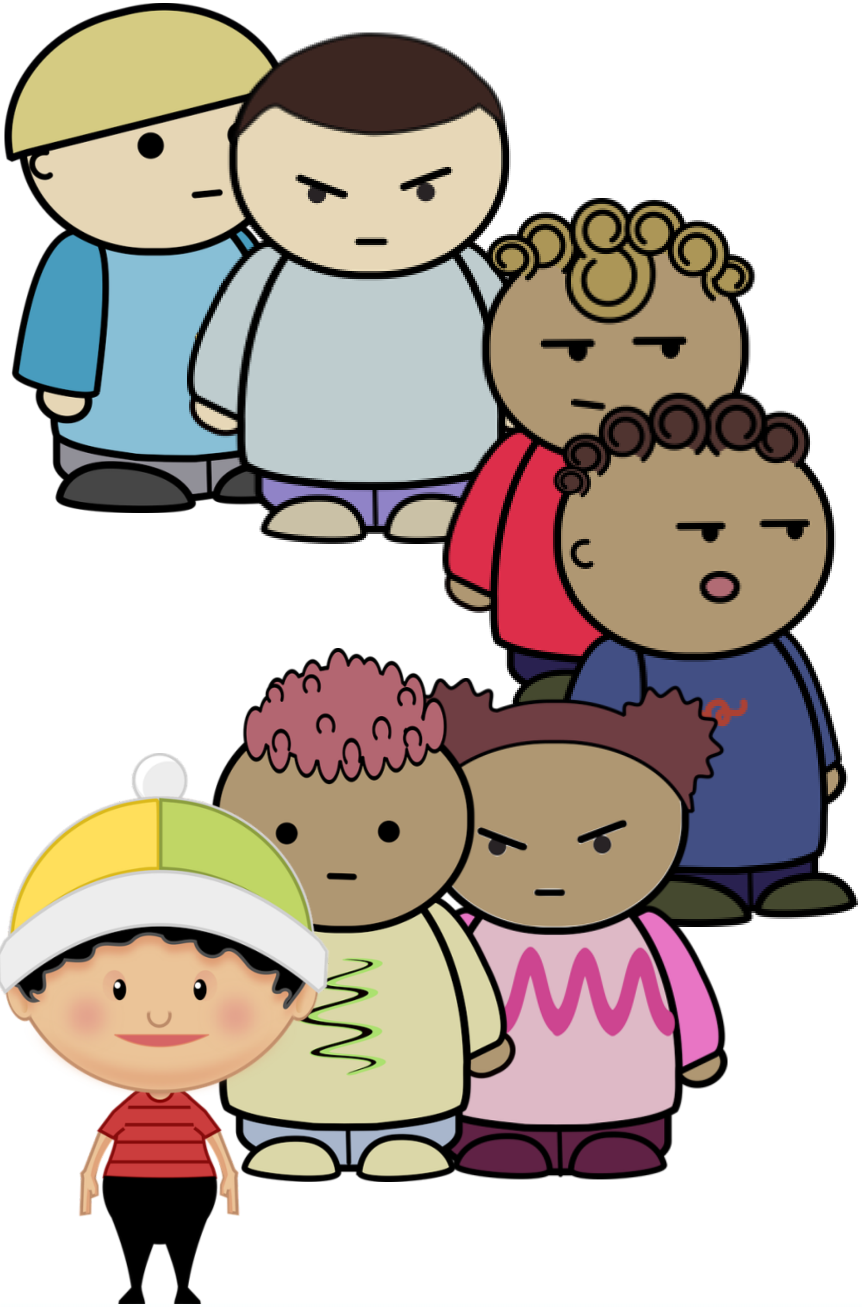


And a set of sensors and actuators :

Motion, temperature, humidity, accelerometer, gyro sensors, stepper motor, , , ,

But then, he recalls he is a civil engineer, . . . it'll be hard for him to make it by himself

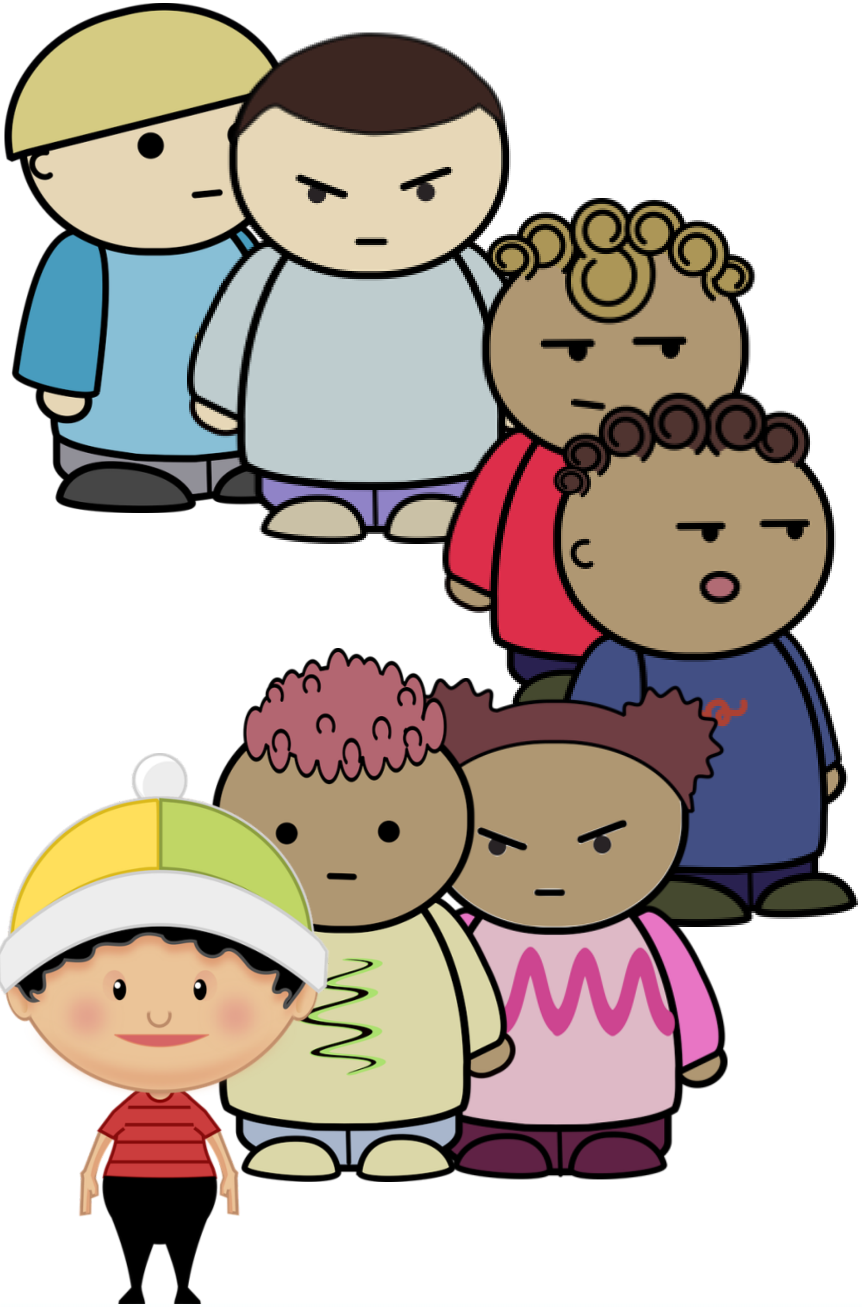




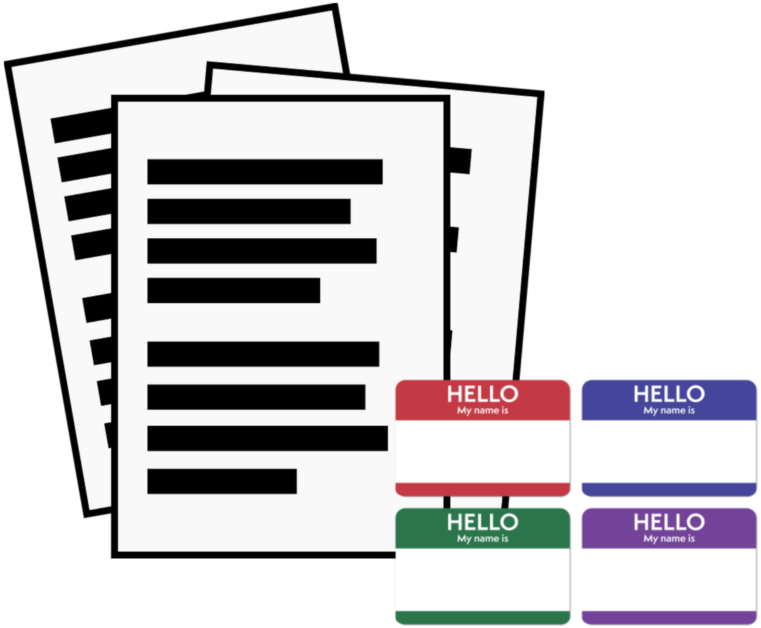
So he needs YOU, a team of 6 students of 3 different programs (2 each)

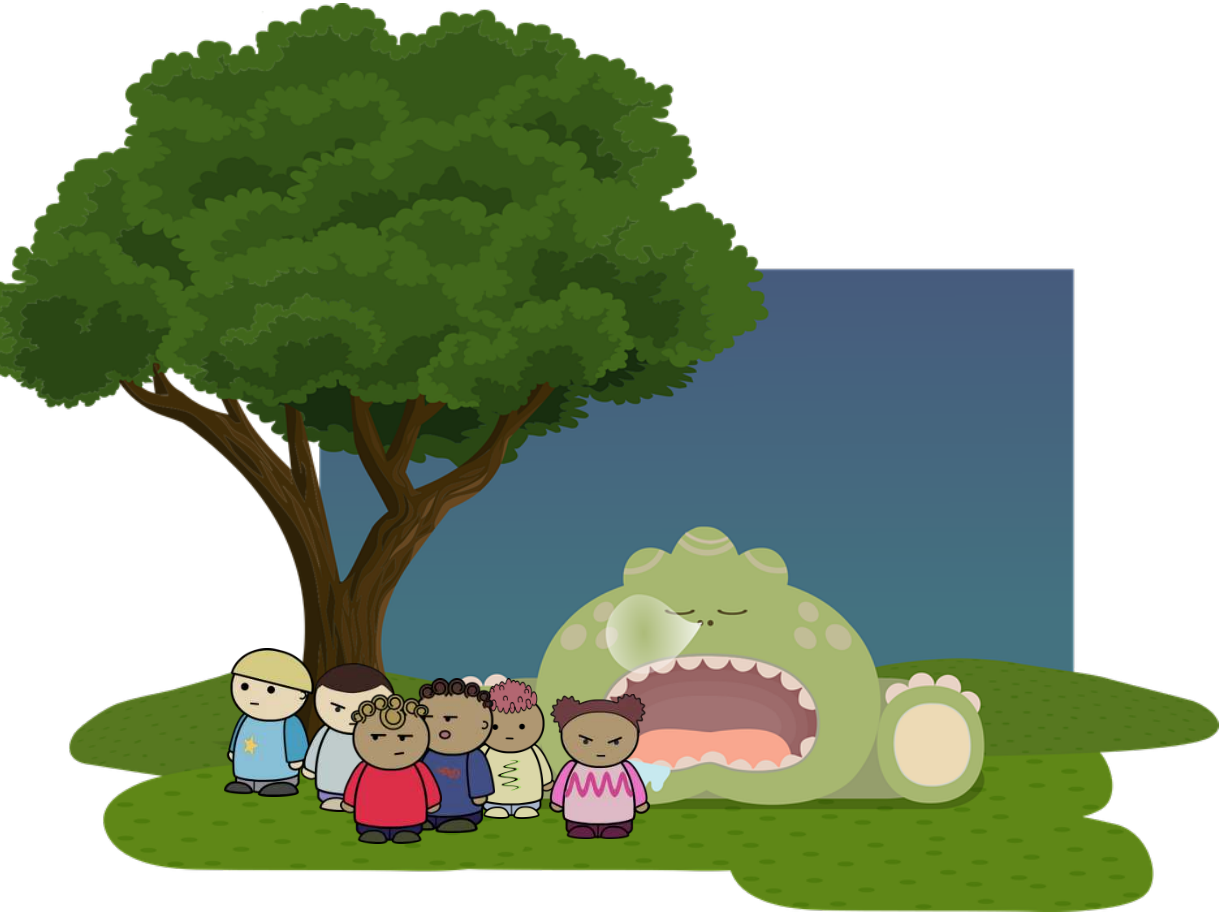
2+2+2=6

Example : 2 Computer Science + 2 Electronics + 2 Mechanics



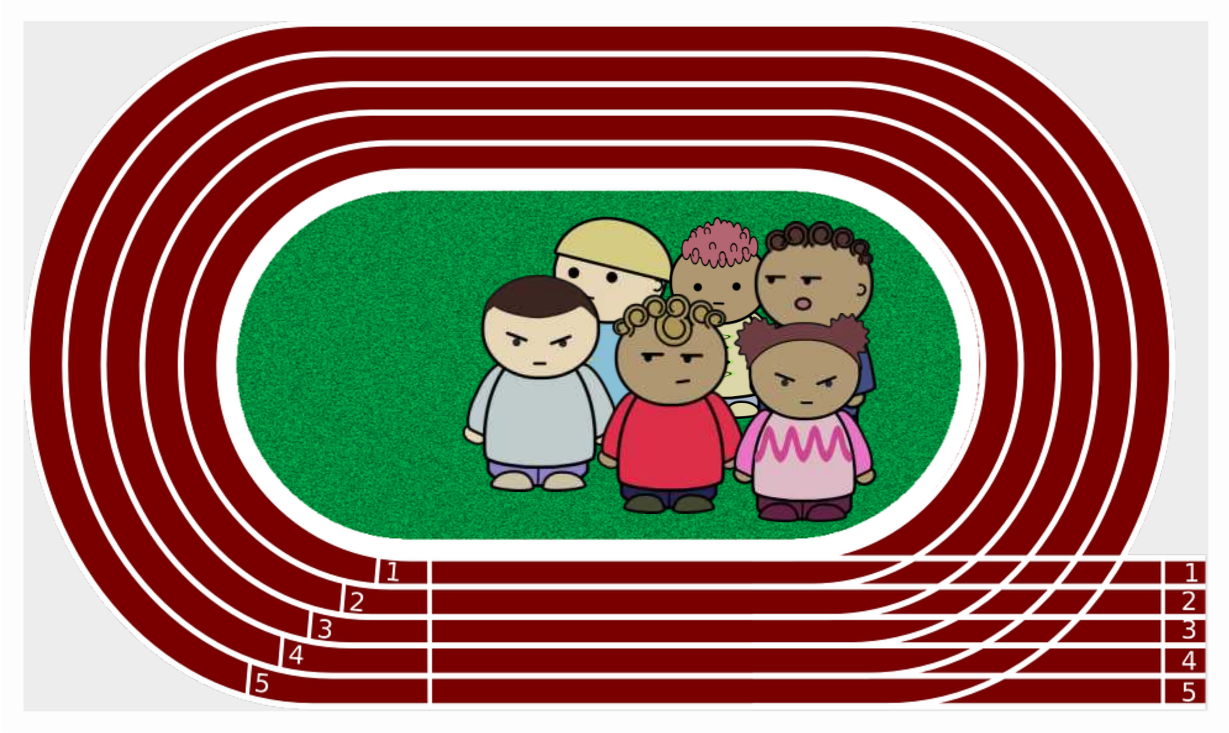
Your Squad Name, Your Curriculum Vitae, and that's it!!

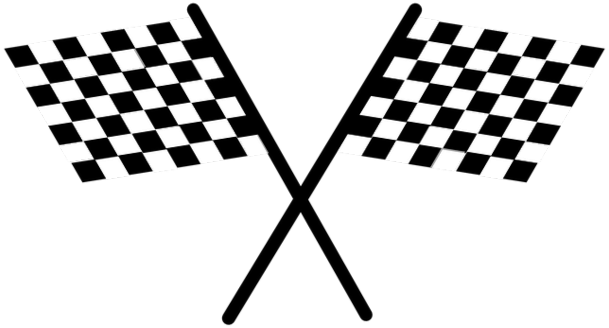




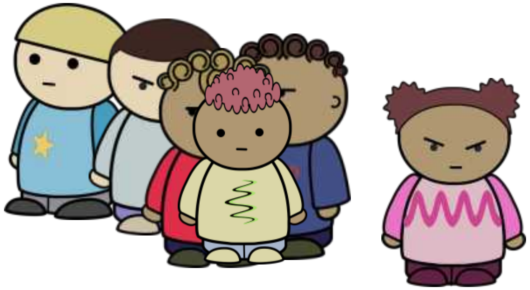
You all should take some GOOD rest before this Thursday as you will have to stay up for the next 48H

Challenge starts on Thursday march the 30th at 08h30 am. You'll have to stay at you team's room.





Rules are very simple



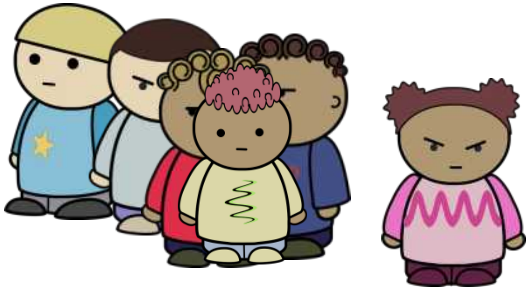
You may :

- Search Internet ✓
- Make use of provided devices and sensors ✓
- Make use of Your PCs ✓
- Eat ✓
- Stay in front of your room ✓

Rules are very simple

But you may not :

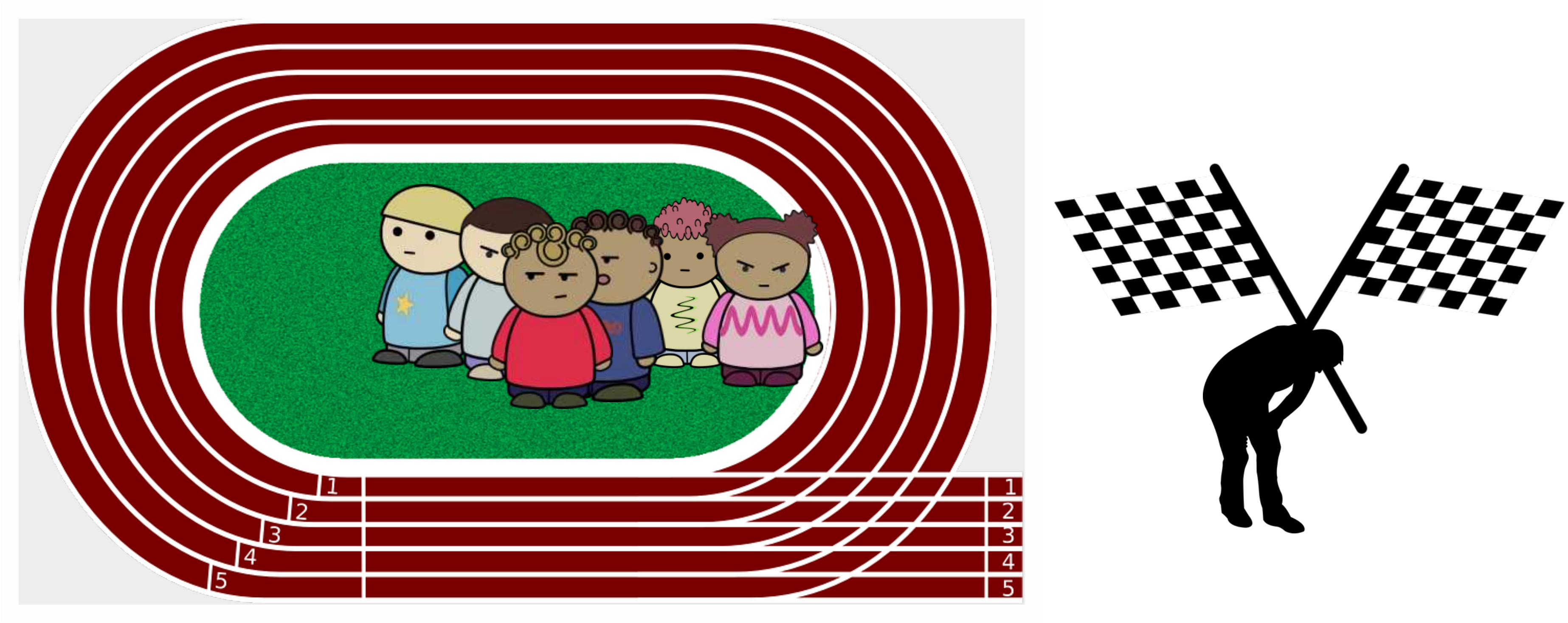
- Quit Room/ENISo ✗
- Email, Facebook, Twitter, … ✗
- Skype, Phone, … ✗
- Bring food ✗
- Smoke in the classroom ✗



✗ = team disqualified

Challenge finishes April the 1st at 08h30 am.

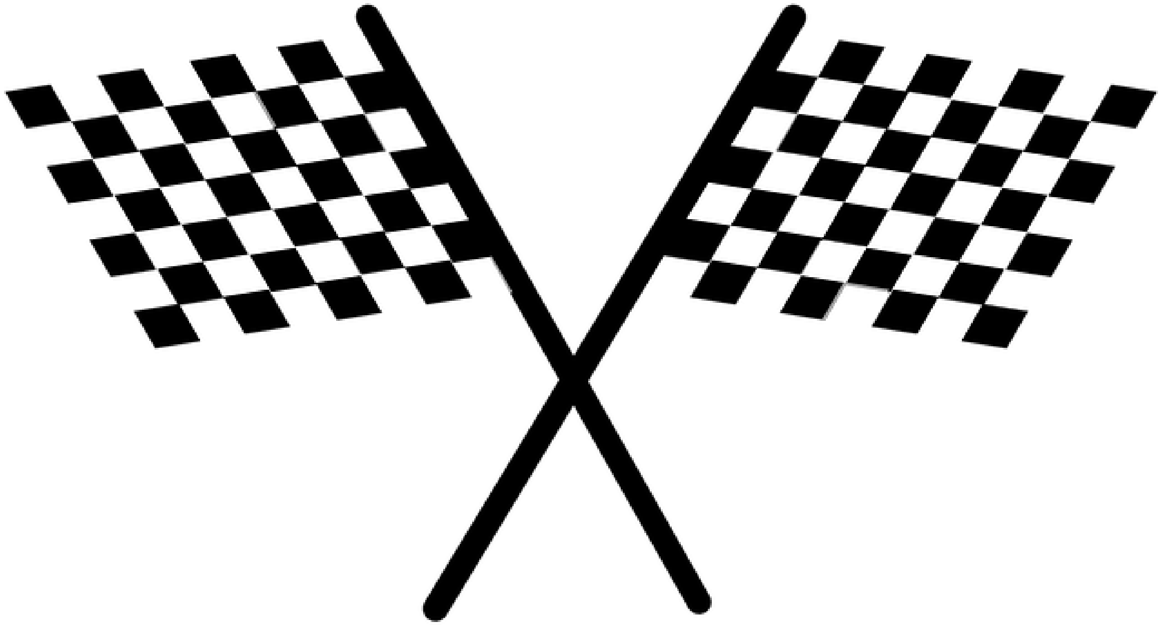
You'll have then to pitch for 5 minutes in front of experts jury then present your prototype



You'll be evaluated on :

- Innovative idea
- Presentation & Design : Aesthetics of the product
- Marketing arguments
- Business Plan
- Intelligent, energetic, embedded features, ...

At your marks . . .



What are you waiting for ???

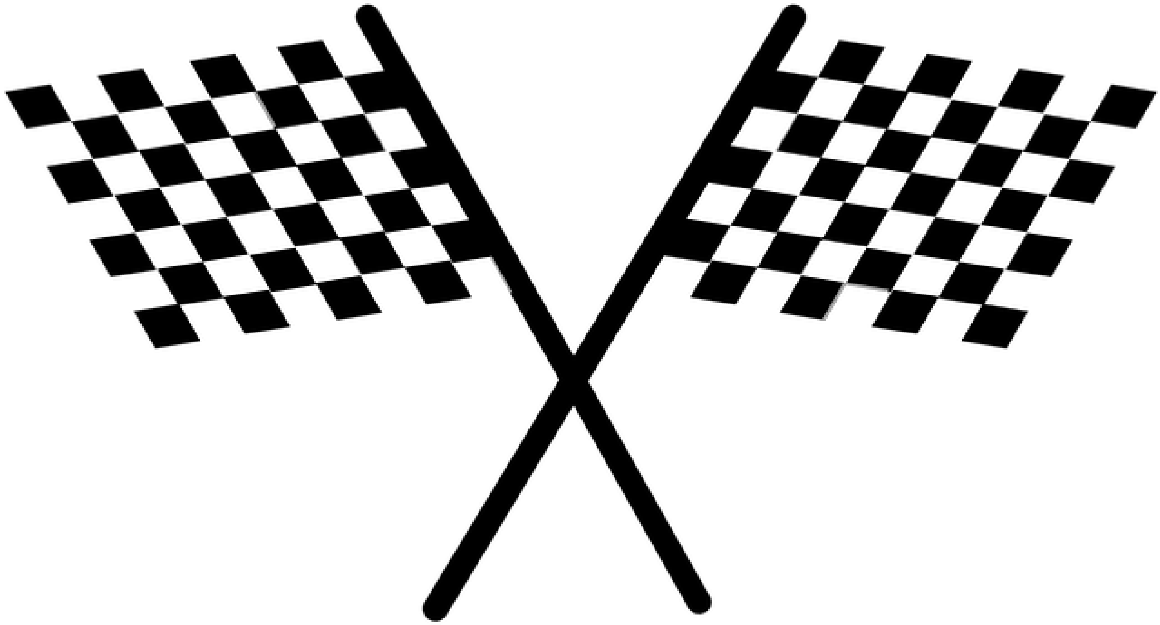
Ah… yeah, prices …

- 1st price :
  - 3000 TND
  - Training + Certification IBM Big Data
  - Participation to Movility Startup contest
- 2nd price :
  - Nothing
- 3rd price :
  - Nothing

Ah… yeah, prices …

- 1st price :
  - 3000 TND
  - Training + Certification IBM Big Data
  - Participation to Movility Startup contest
- 2nd price :
  - Training + Certification IBM Big Data
- 3rd price :
  - Training + Certification IBM Big Data

At your marks . . .



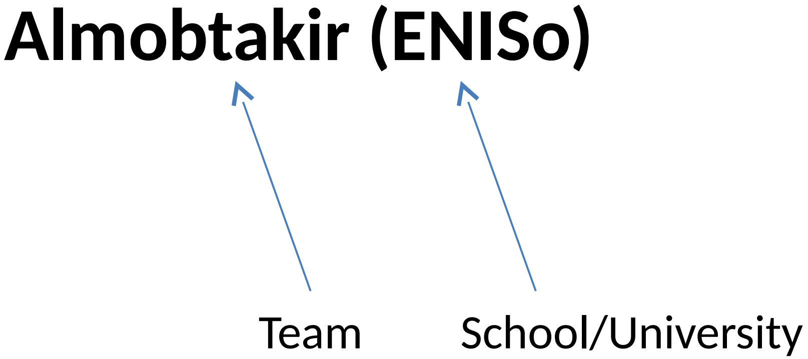
What are you still waiting for ???

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Ah… yeah, challengers …

- Teams selected to participate to this contest are :



Almobtakir (ENISo)

Team

School/University

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)

Ah… yeah, challengers …

- *Teams selected to participate to this contest are :*

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)
CodeX (ENISo)

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)
CodeX (ENISo)
ASHITA (ENISo)

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)
CodeX (ENISo)
ASHITA (ENISo)
Enim team (ENIM)

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)
CodeX (ENISo)
ASHITA (ENISo)
Enim team (ENIM)
Team X (ENIGA)

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)
CodeX (ENISo)
ASHITA (ENISo)

Enim team (ENIM)
Team X (ENIGA)
Think N Lead (ENIGA)

Ah... yeah, challengers ...

- Teams selected to participate to this contest are :

Almobtakir (ENISo)
IEEE_ENIM_SB (ENIM)
Quinzzers (ENIS)
CodeX (ENISo)
ASHITA (ENISo)

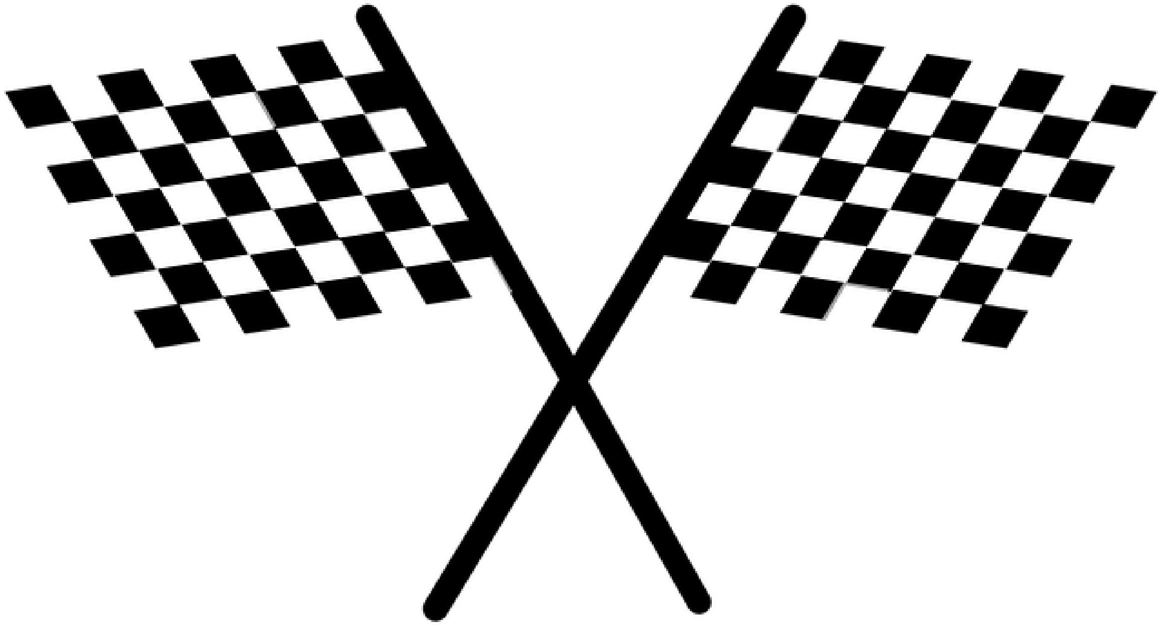
Enim team (ENIM)
Team X (ENIGA)
Think N Lead (ENIGA)
AVRIO (ENISo)

Ah… yeah, challengers …

- Teams selected to participate to this contest are :

Almobtakir (ENISo)	**Enim team (ENIM)**
IEEE_ENIM_SB (ENIM)	**Team X (ENIGA)**
Quinzzers (ENIS)	**Think N Lead (ENIGA)**
CodeX (ENISo)	**AVRIO (ENISo)**
ASHITA (ENISo)	**Pingo (ENISo)**

At your marks . . .



And good luck. . .

Partners

TRITUX
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life.augmented

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Yaslamen
Smart battery management

PROXYM
GROUP

Talan
Tunisie

ARDIA

TELNET
Holding

itSERV

orange™

faurecia

PCS
PÔLE DE COMPÉTITIVITÉ DE SOUSSE

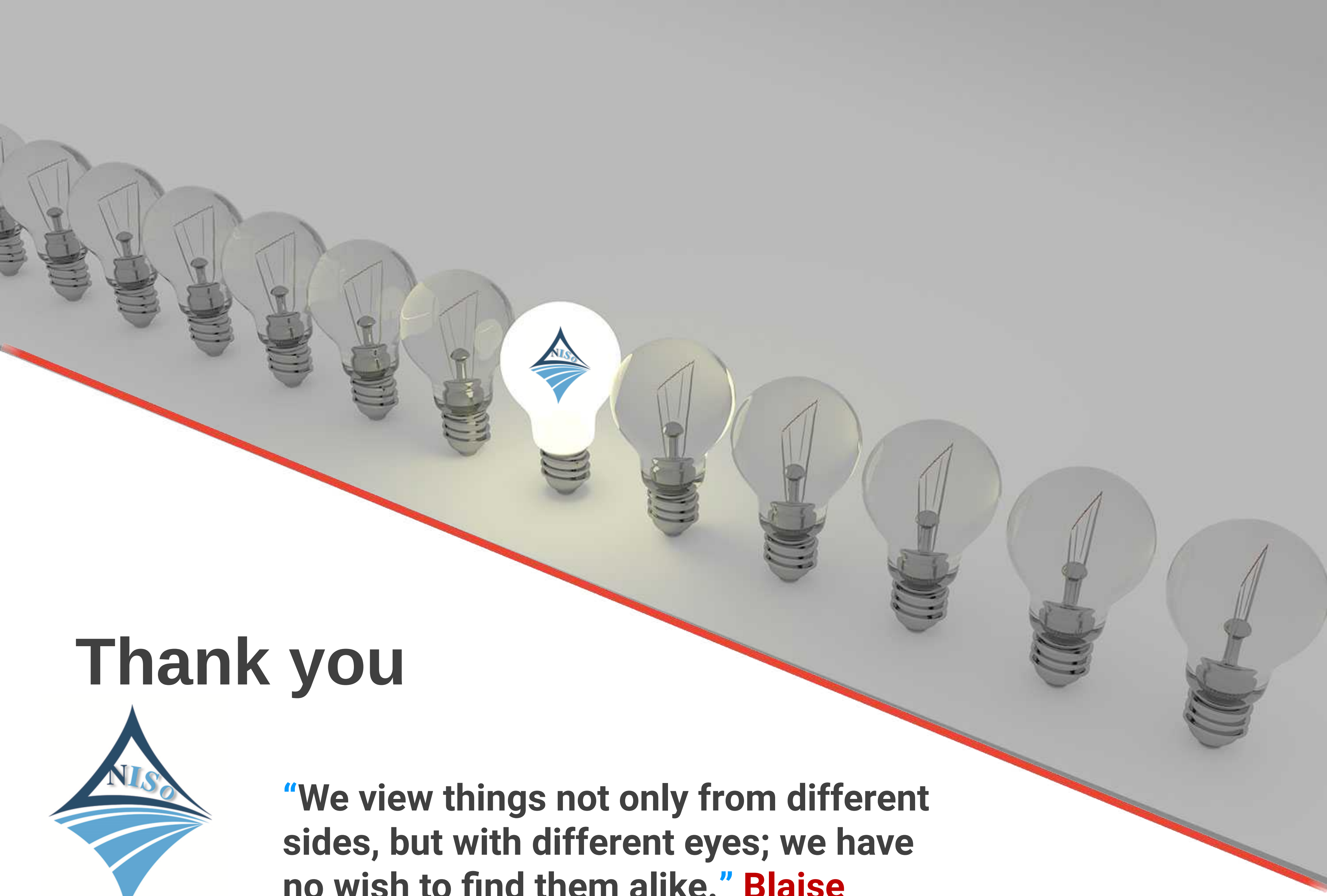
Sofrecom
The Know-How Network

whitecape

Tunisie Telecom

IBM

SAMSUNG



Thank you

“We view things not only from different sides, but with different eyes; we have no wish to find them alike.” **Blaise Pascal**